Krydstogtturismens CO_2 mæssige konsekvenser

Analyse af MRV 22 og MRV 23 data

Revideret 26. juli 2024

Introduktion

Krydstogtrederier, der har opereret krydstogtskibe ind og ud af europæiske havne har iflg. den europæiske MRV lovgivning (The EU MRV (Monitoring, Reporting, and Verification) Maritime Regulation - Regulation (EU) 2015/757), der trådte i kraft 1. januar 2018, skullet indrapportere CO_2 udslip fra driften af disse krydstogtskibe, inklusive sejladstimer og sejldistance samt antal passagerer, så det er muligt at beregne CO_2 udslippet per passager per tilbagelagt sømil, der efterfølgende nemt kan omregnes til at referere til km, idet 1 sømil = 1.852 km.

Flg. CO_2 emissioner skal registreres iflg. MRV reglerne:

1. Samlet mængde udledt CO_2, der falder ind under MRV forordningens anvendelsesområde
2. Samlede CO_2 emissioner fra alle sejladser mellem havne under en medlemsstats jurisdiktion
3. Samlede CO_2 emissioner fra alle sejladser med afgang fra havne under en medlemsstats jurisdiktion
4. Samlede CO_2 emissioner fra alle sejladser til havne under en medlemsstats jurisdiktion
5. CO_2 emissioner udledt i havne under en medlemsstats jurisdiktion, mens skibet ligger ved kaj

Ovennævnte opdeling giver detaljerede oplysninger om, hvilke dele af skibets operationer, som er specielt CO_2 udslippende.

CO_2 udslip per passager per km

MRV resultaterne viser, hvor meget CO_2, der udledes når krydstogtskibene bare ligger i havn og hvor meget de udleder, mens de er til søs. Endvidere er der også oplysninger over det samlede CO_2 udslip per passager, når både havneophold og sejladsen sammenlagt gøres op (Fig. 1)

Skal man sammenligne med andre transportformer som eksempelvis fly og bil, er det CO_2 udslippet per passager per km, når skibet reelt sejler, der er væsentligt (Fig. 2), da det reelt viser, hvor stor CO_2 belastningen er på grund af skibssejlads alene.

Fig. 1 og 2 relaterer sig til skibets maksimale dødvægt, som er den samlede vægt af passagerer, skibets last (beholdninger mv.) samt vægten af brændolie, smøreolie samt vand (både ballastvand og ferskvand til forbrug). I stedet for dødvægten kunne det være praktisk at relatere det specifikke CO_2 udslip til skibets maksimale passager tal, hvilket er gjort muligt ved omregning med en empirisk formel at konvertere dødvægten til den omtrentlige passagermængde, efter flg. formel: passagertal = 0.35 x maks. dødvægt. Formlen er bestemt ved hjælp af en regressionsanalyse af data for 460 krydstogtskibe (Fig. 3), stillet til rådighed af det svenske firma ShipPax, der samler passagerskibsdata fra en stor del af verdens passagerskibsrederier.

Ved hjælp af den angivne regressionsformel har det været muligt at konvertere Fig. 1 og 2 til de resultater der er vist i Fig. 4 og 5, hvor man kan relatere CO_2 udslippet til passagerkapaciteten.

CO_2 emissioner i havn og til søs

I MRV oplysningerne for samtlige krydstogtskibe kan man se, hvor meget CO_2, der er relateret til selve krydstogtsejladsen på havet og hvor meget CO_2 udslip, der finder sted, mens skibene ligger i havn. Sidstnævnte oplysninger er interessante i den intensiverede debat om etablering af landstrøm i krydstogthavnene. Man ser af Fig. 6 at det havnebaserede CO_2 udslip udgør mellem 5 og 20 % af det totale CO_2 udslip med havneophold og sejlads sammenlagt.

Fig. 7 viser, hvor stort det samlede CO_2 udslip til søs er i forhold til krydstogtskibenes totale CO_2 udslip gennem deres operation, såvel til søs som i havn. Den fraktion ligger fra ca. 80 til 95 %, dvs. det overvejende CO_2 udslip sker ikke uventet under den almindelige sejlads, som generelt er energikrævende.

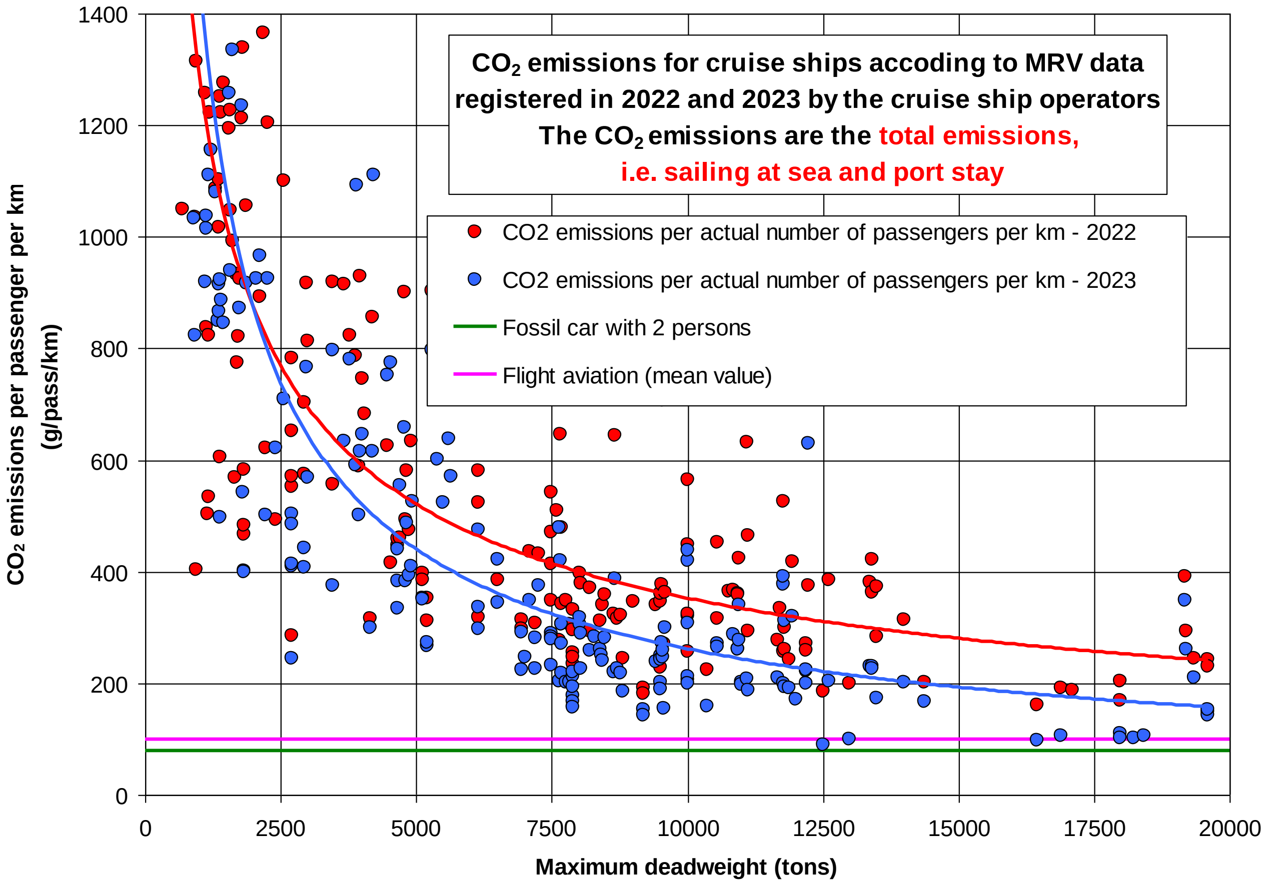

Fig. 1 Totale CO_2 emissioner per passager per km (sejlads og havneophold i alt)

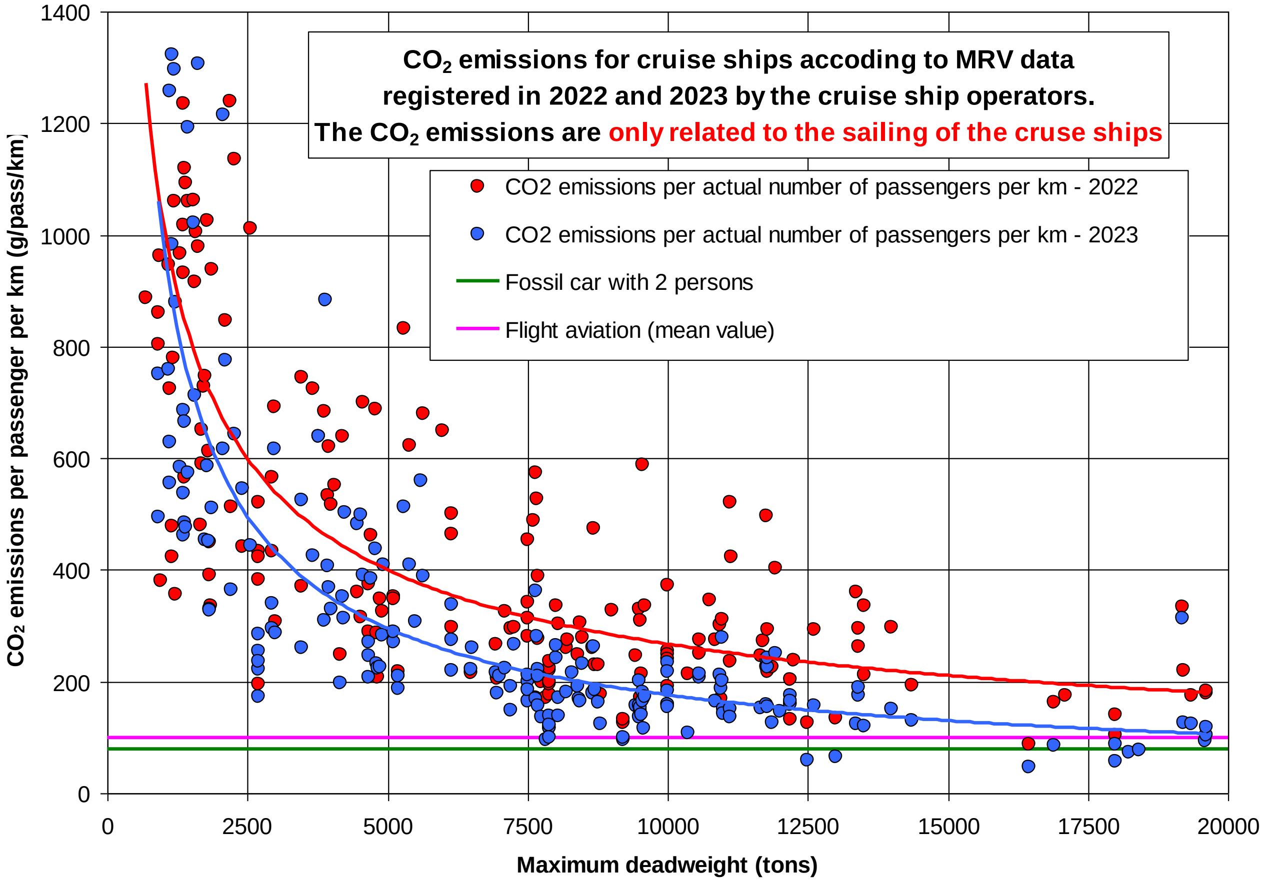

Fig. 2 Totale CO_2 emissioner per passager per km (for sejlads alene)

Forskel mellem tal fra 2022 og 2023

Det er interessant, at se at CO_2 udslippet per passager per km, også benævnt det specifikke CO_2 aftryk, er faldet fra 2022 til 2023, hvilket sandsynligvis skyldes, at passagerbelægningen er steget i samme periode, da rejselysten i disse år er stigende. Den højere belægning vil vise sig i et lavere specifikt CO_2 aftryk. En anden faktor, der kan forventes med øget fokus på mere miljøvenlig skibsfart, er at skibene formentlig er begyndt at sejle lidt langsommere og også har indført forskellige tekniske forbedringer for at mindske energiforbruget. Det er under alle omstændigheder positivt at observere det lavere CO_2 udslip, og netop den observation viser, hvor vigtig det er, at vi har fået MRV lovgivningen med krav om en løbende årlig registrering af den miljømæssige performance for de forskellige skibstyper.

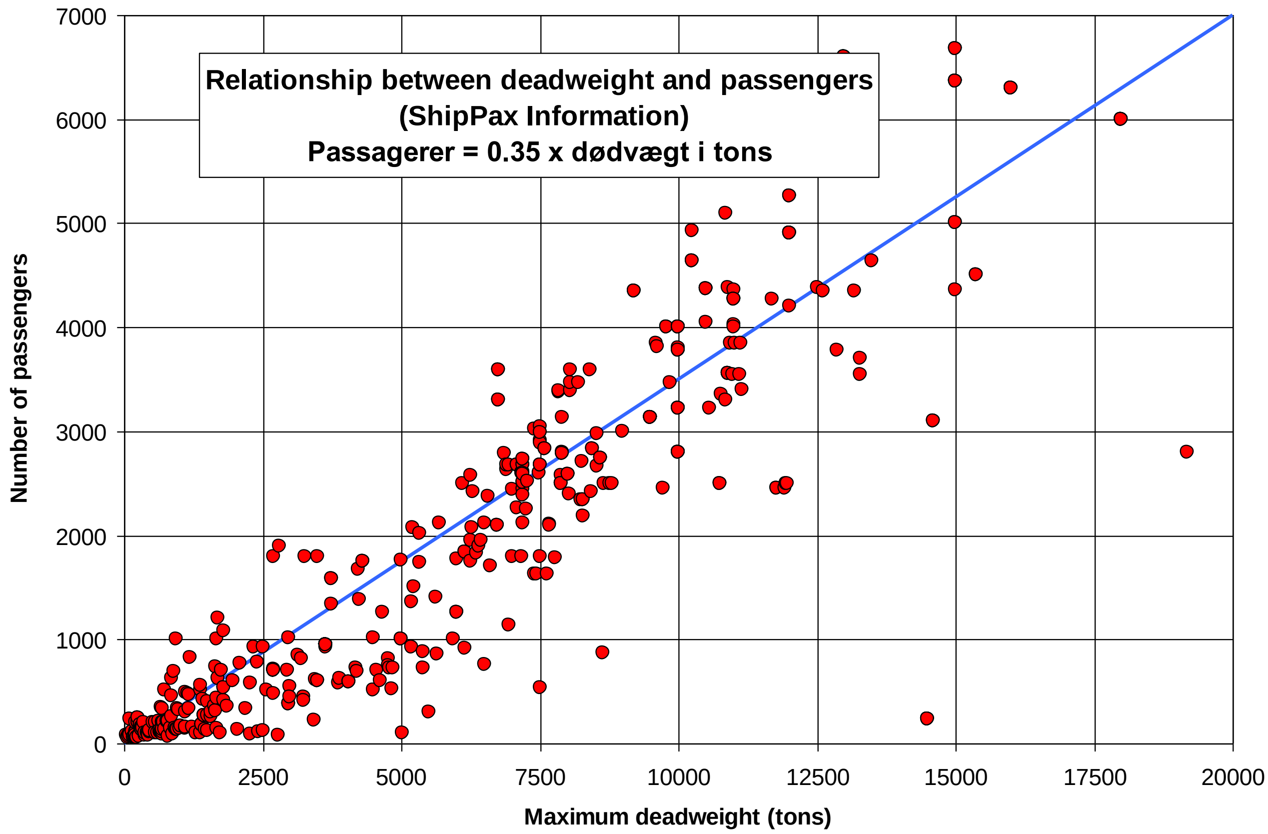

Fig. 3 Sammenhæng mellem maksimal dødvægt og maks. passagertal

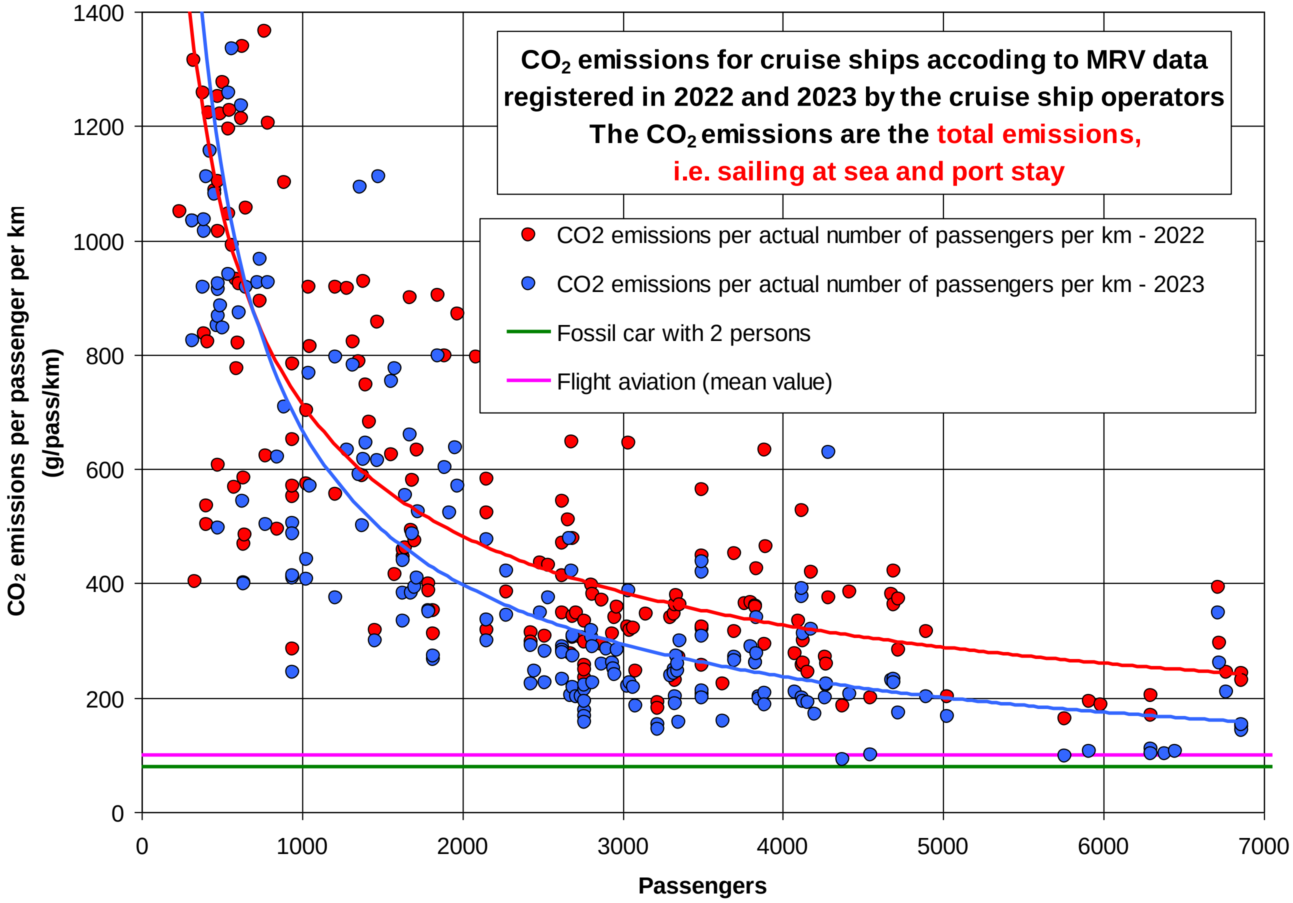

Fig. 4 Totale CO_2 emissioner per passager per km (sejlads og havneophold i alt)

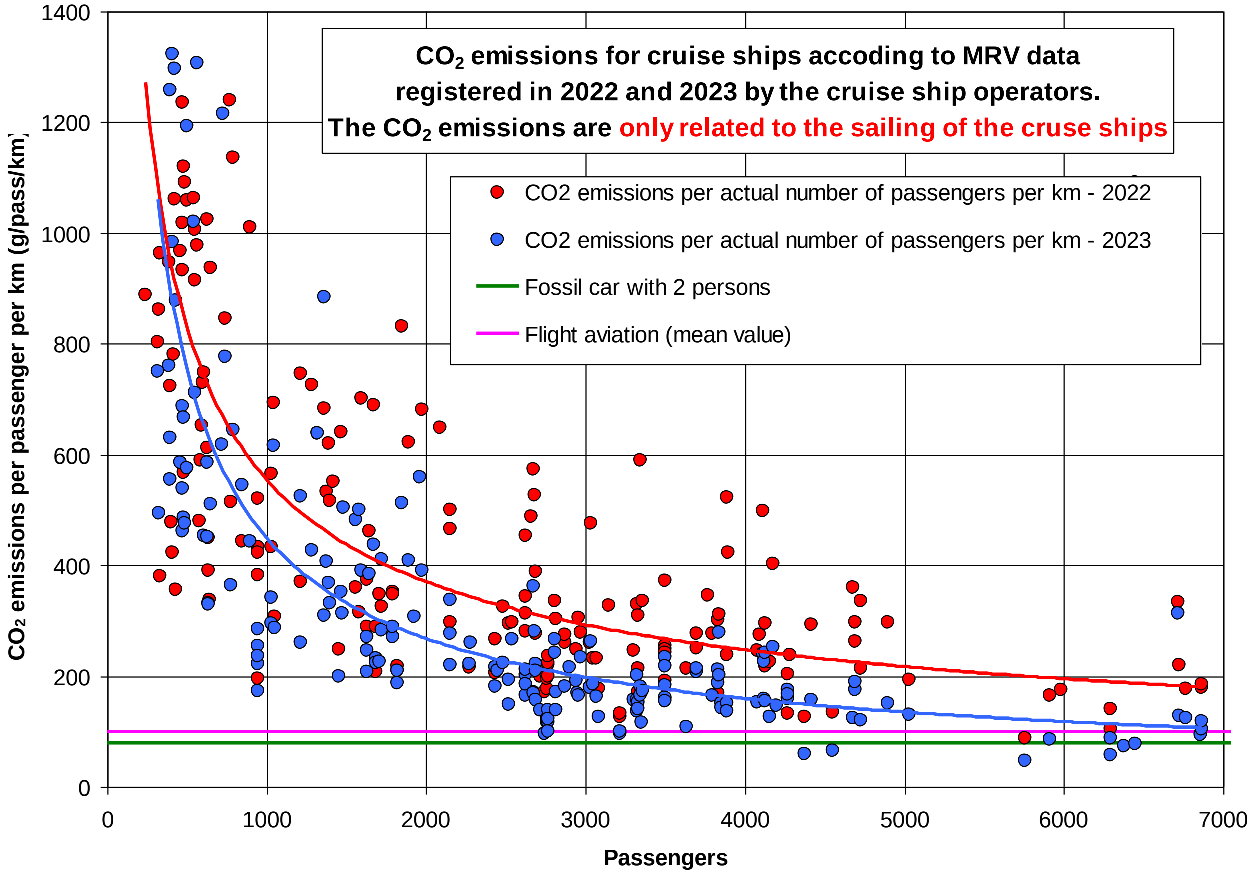

Fig. 5 Totale CO_2 emissioner per passager per km (for sejlads alene)

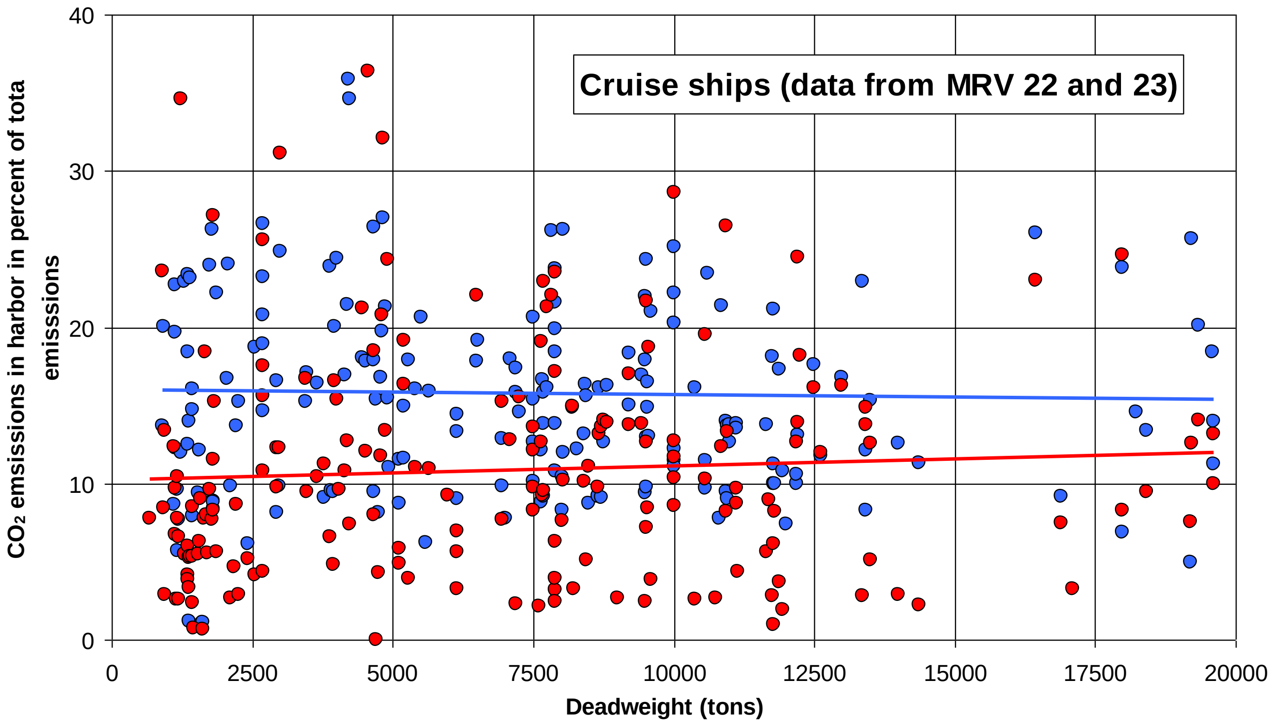

Fig. 6 CO_2 emissioner i havn i pct. af skibenes totale CO_2 emissioner

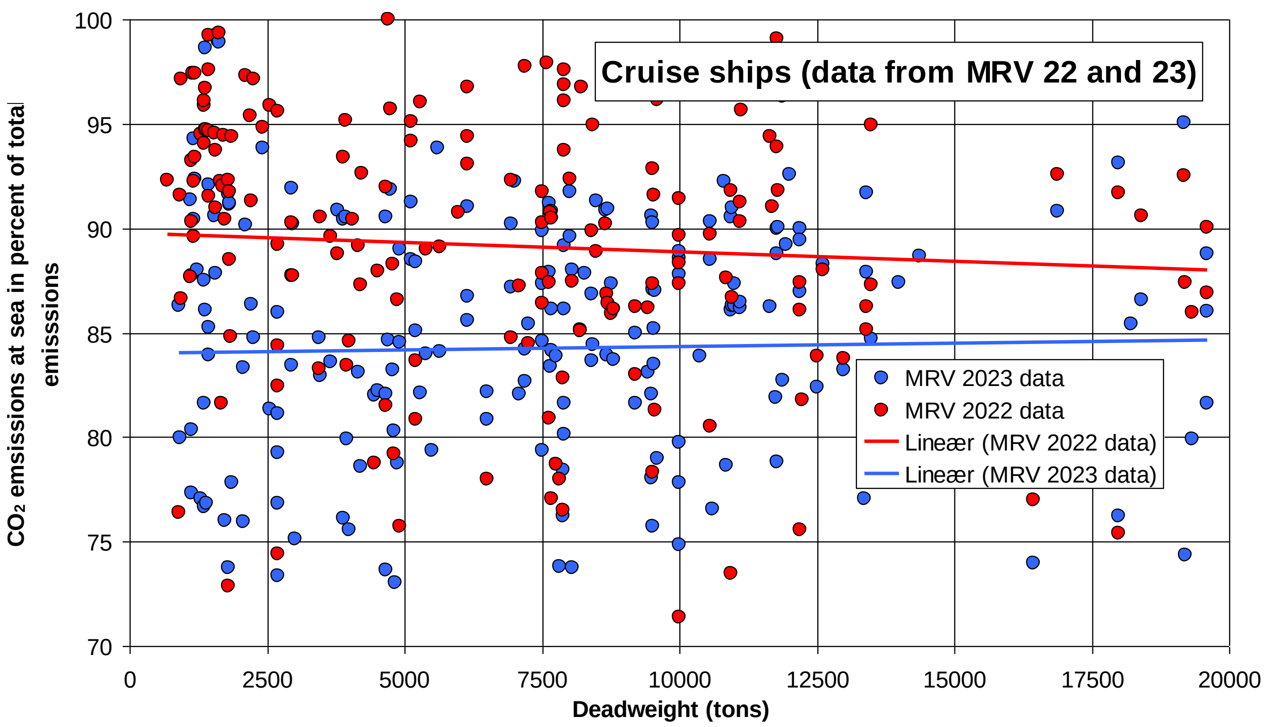

Fig. 7 CO_2 emissioner til søs i pct. af skibenes totale CO_2 emissioner

SPITSBERGEN

887 g CO_2 per passager per km

Byggeår - 2009

Kapacitet – 220 passagerer

Ombygnings år - 2016

Brutto tonnage - 7344 GT

Fart – 14.5 knob

Længde - 100 m

Bredde - 18 m

After a complete reconstruction, MS Spitsbergen joined the Hurtigruten fleet in 2016. The ship features high technical standards as well as comfortable, modern public areas and cabins. She is modern and environmentally progressive and will undergo further improvements that will reduce emissions and fuel consumption even more. The new ship's maneuverability and optimal size make her quite suitable for exploring polar waters.

FRIDTJOF NANSEN

442 g CO_2 per passager per km

Byggeår – 2020

Kapacitet – 528 passagerer

Brutto tonnage - 20889 GT

Fart – 15 knob

Længde - 140 m

Bredde – 23.6 m

VIKING MARS

499 g CO_2 per passager per km

Byggeår – 2021

Kapacitet – 930 passagerer

Brutto tonnage - 480000 GT

Længde - 227 m

Bredde – 28.6 m

SEVEN SEAS SPLENDOR

389 g CO_2 per passager per km

Byggeår – 2020

Kapacitet – 1360 passagerer

Brutto tonnage - 55182 GT

Fart – 19.4 knob

Længde - 224 m

Bredde – 31 m

MEIN SCHIFF 4

126 g CO_2 per passager per km

Byggeår – 2015

Kapacitet – 2506 passagerer

Brutto tonnage - 99526 GT

Fart – 20 knob

Længde - 293 m

Bredde – 35.8 m

QUEEN MARY 2

313 g CO_2 per passager per km

Byggeår – 2004

Kapacitet – 2691 passagerer

Brutto tonnage - 149215 GT

Fart – 26 knob

Længde - 345 m

Bredde – 41 m

SYMPHONY OF THE SEAS

93 g CO_2 per passager per km

Byggeår – 2018

Kapacitet – 6680 passagerer

Brutto tonnage - 228081 GT

Fart – 22 knob

Længde - 362 m

Bredde – 47.4 m

MSC WORLD EUROPA

78 g CO_2/passager per km

Byggeår – 2022

Kapacitet – 6762 passagerer

Brutto tonnage - 215863 GT

Fart – 20 knob

Længde - 333 m

Bredde – 47 m

Have you ever wondered what the carbon emissions of staying in a hotel might be? In this article we'll look at the differing impacts across multiple countries and continents.

https://circularecology.com/news/the-carbon-emissions-of-staying-in-a-hotel

Every year, the Department for Environment, Food & Rural Affairs (DEFRA) release its Greenhouse gas reporting: conversion factors. This comprehensive database of factors is widely used by UK and international organisations to report on greenhouse gas emissions. Within the 2022 dataset, conversion factors for international hotel stays are included for 38 countries. This allows for comparison of the carbon emissions of staying in a hotel across continents. Circular Ecology has done just this.

How are the Carbon Emissions Calculated?

The hotel conversion factors are taken from the Hotel Footprinting Tool which is produced by the International Tourism Partnership and Greenview . These factors have been derived from the Cornell Hotel Sustainability Benchmarking Index which uses annual data from international hotel companies. Further information, including data by city, can be found here.

Notes:

Factors represent an average class of hotel and can be applied to any type of hotel

Factors are calculated as an average for the specified country

Countries with the highest and lowest emission factors

The data set released in 2022 includes information for hotel stays in 38 different countries. The carbon impact of a night's stay in each is shown in Figures 1 and 2.

A bar graph of the DEFRA factors for 19 countries. **It shows the emissions factor for a hotel stay in each country per room per night.** Costa Rica has the lowest emissions factor. This is the lower half of the results.

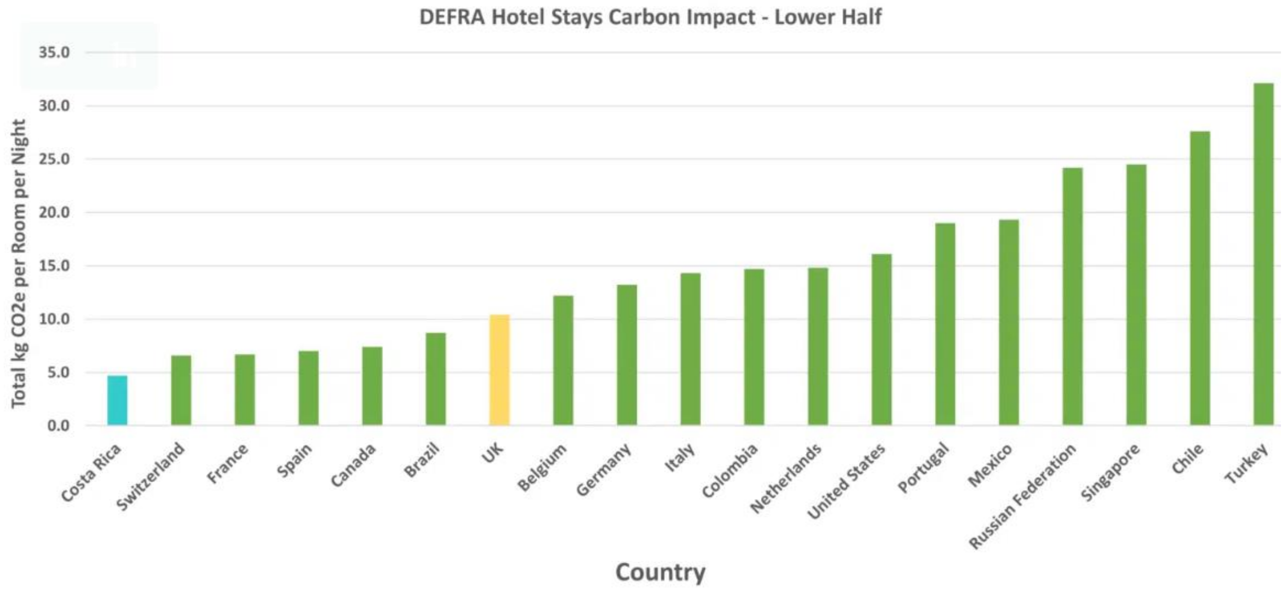

Figure 1 – DEFRA Conversion Factors 2022 Hotel Stays (lower half)

A bar graph of the DEFRA factors for 19 countries. It shows the emissions factor for a hotel stay in each country per room per night. Maldives has the highest emissions factor. This is the upper half of the results.

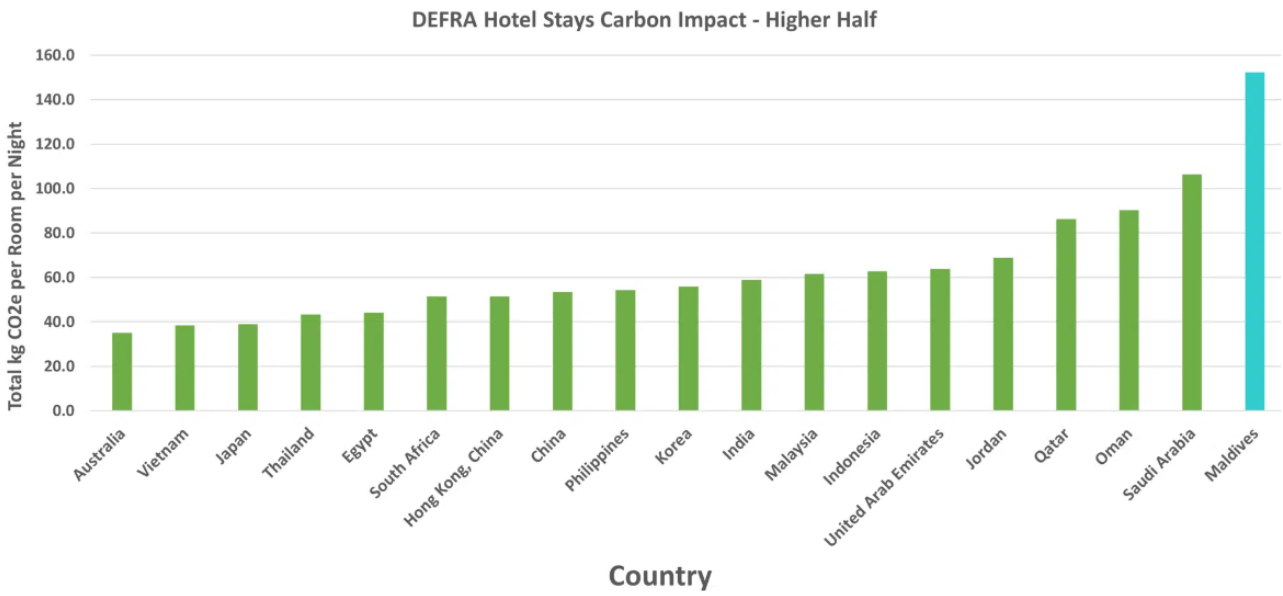

Figure 2 – DEFRA Conversion Factors 2022 Hotel Stays (upper half)

The country with the highest carbon impact is the Maldives at 152.2 kg CO_2e per hotel room per night. The lowest impact is Costa Rica at 4.7 kg CO_2e per hotel room per night, a large difference of 147.5 kg CO_2e. (Both shown in blue)

Additionally, Figure 2 shows that many of the countries with the highest impact hotel stays are located in Asia. Saudi Arabia, Oman and Qatar, for example show some of the highest impacts.

What influences the carbon emissions?

In the case of Costa Rica, most of the energy supply across the country is derived from renewables. According to the country's National Centre for Energy Control, Costa Rica has been running on more than 98% renewable energy since 2014, with 67.5% of this coming from hydropower.

As a result, hotels in Costa Rica are using a low carbon energy mix resulting in the low carbon impact as seen in the DEFRA 2022 Conversion Factors.

In stark contrast, data from the International Renewable Energy Agency concluded that 99% of the total energy supply for the Maldives in 2019 came from oil (IRENA). Furthermore, the same report also shows that the Maldives imported 100% of its energy.

Interestingly, the report also details that there is significant capacity for solar and wind generation on the Maldives islands. However, the funding towards renewables has significantly declined since 2014. This indicates that although the Maldives has the potential to be more self-sufficient in terms of energy supply, it is perhaps still deemed more economically beneficial for them to import it for now.

Additionally, due to the size and remoteness of the islands, large amounts of resources are imported to the Maldives. Given that tourism is the largest sector of Maldives economy, it could be expected that a lot of imports are used for hotels and resorts. In fact in 2021, $2.57B worth of goods were imported (Statistica). This would undoubtedly contribute significantly to the carbon footprint of the hotels and resorts.

Average emissions by continent

Figure 3 shows the average emissions by continent. This again shows that hotels located in Asia have the highest average impact per room per night. The most complete information available is for Asia, with 17 of the 38 countries that make up the DEFRA data. A further 10 countries are European.

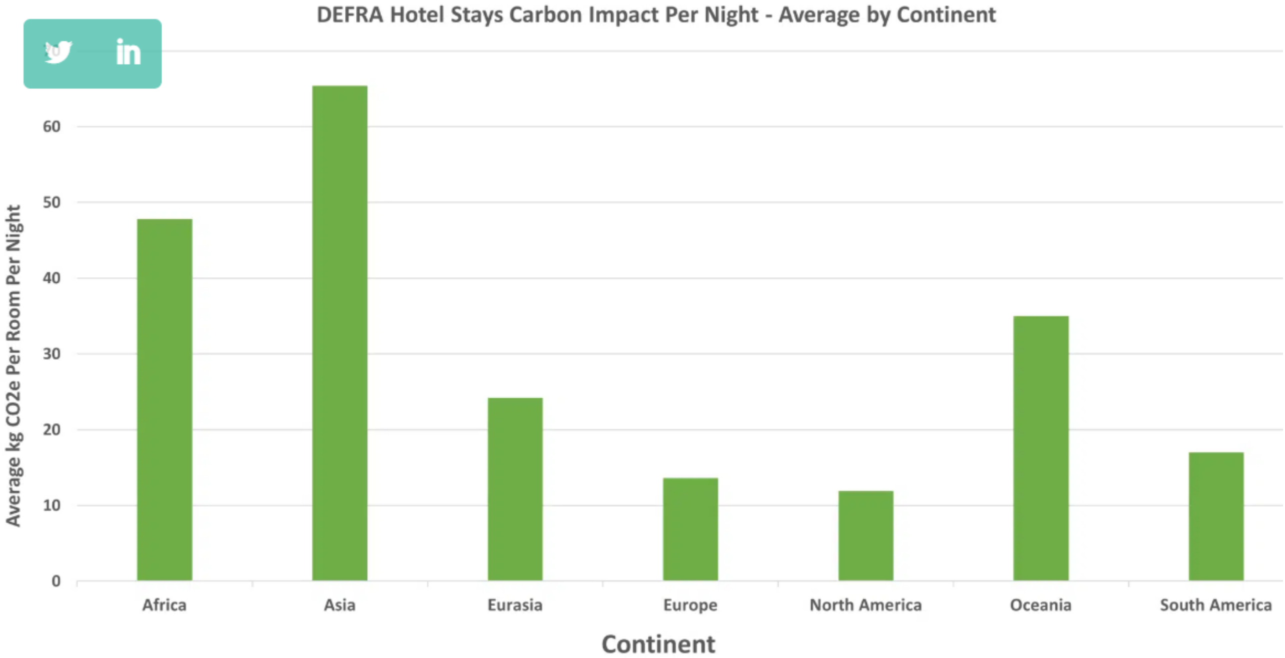

Figure 3 – DEFRA Conversion Factors 2022 Hotel Stays Average by Continent

At this time, there are very few countries represented from the other continents: two from Africa, four from North America, three from South America and one from Oceania. The small amount of data is a limitation and means the averages will not best represent the entire continent. Nevertheless, they offer interesting insight on the differences in hotel stay emissions across the world.

Staying in a hotel in the UK

According to DEFRA, the carbon emissions of staying in a hotel in the UK are 10.4 kg CO_2e. (Per room per night).

How does this rank amongst the other available data? A figure of 10.4 kg CO_2e per room per night ranks the UK a little outside the top five lowest impact hotel stays in 7th place. Overall, it is the 4th lowest footprint within the European countries where data is available. Only Switzerland, France and Spain outrank the UK.

Figure 4 shows the top five countries as well as the UK in yellow for comparison. Although the UK has one of the lower carbon emissions per room per night, there are still significant opportunities for further reductions by increasing our use of renewable energy.

Whilst Costa Rica has the advantage of consistent sunshine for its solar panels and France have a significant amount of nuclear power, they provide an example of where the UK would one day need to be.

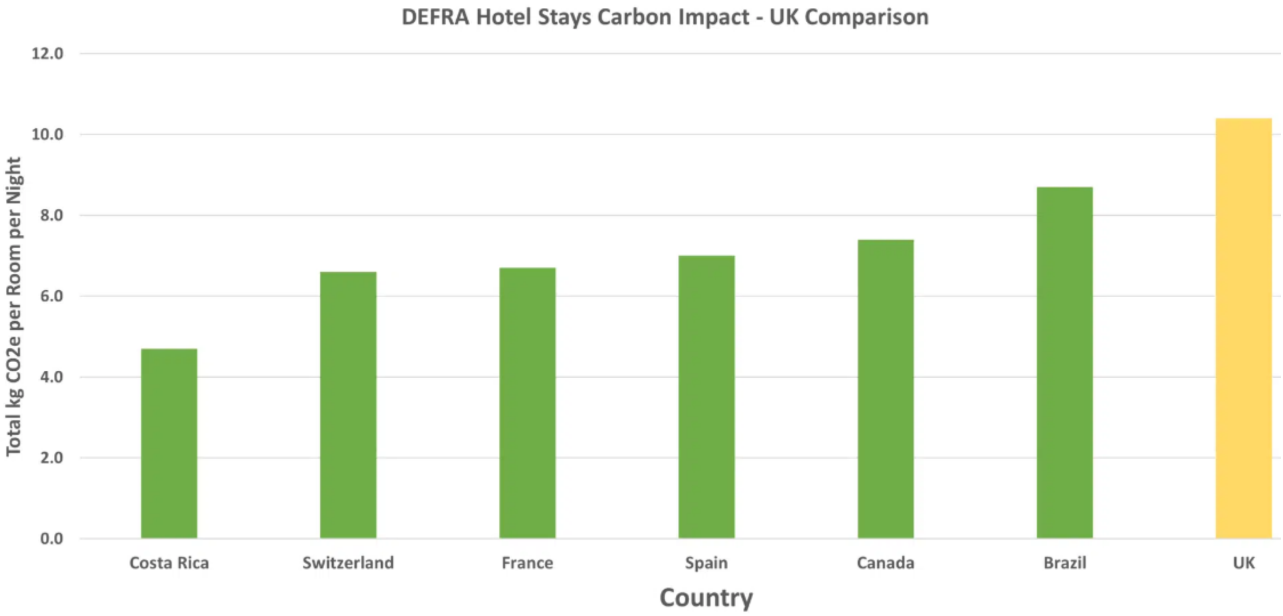

Figure 4 – DEFRA Conversion Factors 2022 Hotel Stays UK Comparison

Summary

In conclusion, countries like the Maldives and Saudi Arabia, who both have a footprint of over 100 kg CO_2e per room per night, have a lot to do to reduce the carbon emissions of their hotels. Outside influence may prove helpful in order to encourage countries to invest in low carbon technologies renewable energy facilities.

In addition to trying to reduce the impact of hotel stays, individuals should also make every effort to reduce their travel carbon footprint. Whilst the figures for many countries could be considerable for a 2-week holiday, with the added impact of any travel to be factored into the final decision, there are certainly countries that the carbon conscious traveller could visit while minimising concerns over their own personal carbon footprint. For example, travelling to France from the UK via the Eurostar would have a much lower carbon impact than flying. Added to the low impact per room per night in France, a great but lower carbon holiday can be enjoyed.

Calculation example for one night at a cruise ship compared with a stay at a hotel

A family of 2 persons travel with a cruise ship from port to port. Departuring at night at 18.00 and arriving the next morning at 8.00 the sailing time is 14 hours. Assuming an average speed of 15 knots during the night the sailing distance is 14 x 15 x 1.852 = 390 km resulting in 2 x 390 x 0.4 kg CO_2 emissions = 314 kg CO_2 emissions, which is 314/60 = 5.2, i.e. **5 times higher than the CO_2 emissions from staying in a hotel for one night.**

The factor 60 kg CO_2/per night is taken as an average of Figs. 1, 2 and 3 in the DEFRA report